

Novel Hybrid CMOS X-ray Detector Developments for Future Large Area and High Resolution X-ray Astronomy Missions

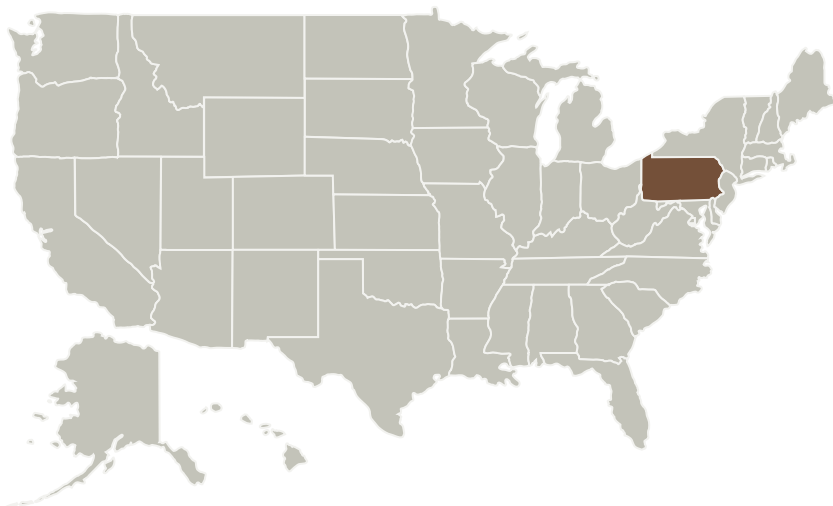
Completed Technology Project (2016 - 2020)



Project Introduction

In the coming years, X-ray astronomy will require new soft X-ray detectors that can be read very quickly with low noise and can achieve small pixel sizes over a moderately large focal plane area. These requirements will be present for a variety of X-ray missions that will attempt to address science that was highly ranked by the Decadal Review, including missions with science that over-laps with that of IXO and ATHENA, as well as other missions addressing science topics beyond those of IXO and ATHENA. An X-ray Surveyor mission was recently endorsed by the NASA long term planning document entitled "Enduring Quests, Daring Visions," and a detailed description of one possible realization of such a mission has been referred to as SMART-X, which was described in a recent NASA RFI response. This provides an example of a future mission concept with these requirements since it has high X-ray throughput and excellent spatial resolution. We propose to continue to modify current active pixel sensor designs, in particular the hybrid CMOS detectors that we have been working with for several years, and implement new in-pixel technologies that will allow us to achieve these ambitious and realistic requirements on a timeline that will make them available to upcoming X-ray missions. This proposal is a continuation of our program that has been working on these developments for the past several years. The first 2 years of the pro-gram led to the development of a new circuit design for each pixel. The proposed activity for the next four years will be to design a large format device that incorporates this pixel layout and to fabricate this large format device so it can be fully tested and characterized.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Responsible Program:

Astrophysics Research and Analysis

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Primary U.S. Work Locations

Pennsylvania

Project Management

Program Director:

Michael A Garcia

Program Manager:

Dominic J Benford

Principal Investigator:

Abe Falcone

Co-Investigators:

Amanda E Brown

Zachary R Prieskorn

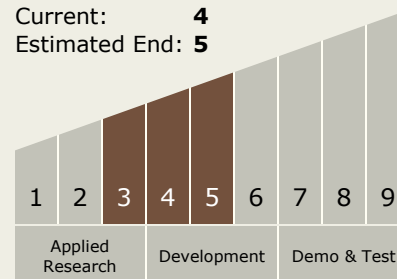
David N Burrows

Technology Maturity (TRL)

Start: 3

Current: 4

Estimated End: 5



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.2 Observatories
 - └ TX08.2.1 Mirror Systems

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Target Destination

Outside the Solar System